Amendment and Response
Applicant: Clyde M. Guest et al.
Serial No.: 09/848,479
Filed: May 3, 2001
Docket No.: A126.164.102 (Previously: B63814C-013377-0084)
Title: SYSTEM AND METHOD FOR SELECTION OF A REFERENCE DIE

IN THE CLAIMS

Please amend claim 73, 79, 90, and 98 as follows:

1. – 72.(Cancelled)

73.(Currently Amended)   A system for selection of a reference die image comprising:

a die image comparator operable to create a difference image without a manually selected reference image, wherein the difference image is based upon a first die image and a second die image; and

a difference image analysis system coupled to the die image comparator, the difference image analysis system operable to analyze the difference image and to determine whether the first die image and the second die image may each be used as the reference die image.

74.(Previously Presented)   The system of claim 73 further comprising a die imaging system coupled to the die image comparator, the die imaging system operable to create a digital representation of a die.

75.(Previously Presented)   The system of claim 73 further comprising a die image storage system coupled to the die image comparator, the die image storage system operable to store data representative of the first die image and the second die image.

76.(Previously Presented)   The system of claim 73 wherein the difference image analysis system further comprises a slope detector, the slope operable to determine whether the slope of a histogram changes from negative to positive.

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77.(Previously Presented)   The system of claim 73 wherein the difference image analysis system further comprises a size detector, the size detector operable to determine whether a size of an anomalous region exceeds a predetermined allowable size.

78.(Previously Presented)   The system of claim 73 wherein the image analysis system further comprises a density detector, the density detector operable to determine whether a number of anomalous regions per unit area exceeds a predetermined allowable number of anomalous regions per unit area.

79.(Currently Amended)   A system for inspecting dies comprising:

a camera configured to obtain an image of one or more dies; and

a reference die detection system coupled to the camera, the reference die detection system operable to determine via comparison whether a first die image and a second die image may be used as reference images, without using a manually selected reference image.

80.(Previously Presented)   The system of claim 79 wherein the reference die detection system further comprises an image comparator operable to produce a difference image from the first die image and the second die image.

81.(Previously Presented)   The system of claim 80 wherein the reference die detection system further comprises a difference analyzer coupled to the image comparator, the difference analyzer operable to determine whether the difference image contains unacceptable features.

82.(Previously Presented)   The system of claim 81 wherein the difference analyzer further comprises a data sorter that is operable to receive brightness data associated with a plurality of pixels of the difference image and to create a histogram from the brightness data.

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83.(Previously Presented) The system of claim 82 wherein the difference analyzer further comprises a slope detector coupled to the data sorter, the slope detector operable to determine whether a slope of the brightness data histogram changes from negative to positive as a brightness magnitude increases.

84.(Previously Presented) The system of claim 82 wherein the difference analyzer further comprises a dimension analyzer that is operable to determine (a) one or more dimensions for a group of pixels, where each pixel has a brightness magnitude that exceeds a predetermined allowable magnitude, and (b) whether one or more dimensions of the group of pixels exceeds one or more predetermined allowable dimensions.

85.(Previously Presented) The system of claim 82 wherein the difference analyzer further comprises a density analyzer that is operable to determine (a) one or more dimensions of two or more groups of pixels, where each group of pixels has a brightness magnitude that exceeds a predetermined allowable magnitude, and (b) whether a density of the two or more groups of pixels per unit area exceeds a predetermined allowable density.

86.(Previously Presented) The system of claim 81 wherein the difference analyzer further comprises a data sorter that is operable to receive image data associated with a plurality of pixels of the difference image and to create a histogram from the image data.

87.(Previously Presented) The system of claim 86 wherein the difference analyzer further comprises a slope detector coupled to the data sorter, the slope detector operable to determine whether a slope of the image data histogram changes from negative to positive as an image data magnitude increases.

88.(Previously Presented) The system of claim 86 wherein the difference analyzer further comprises a dimension analyzer that is operable to determine (a) one or more dimensions of a group of pixels, where each group of pixels has an image data magnitude that exceeds a

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predetermined allowable magnitude, and (b) whether the dimensions of the group of pixels per unit area exceeds one or more predetermined allowable dimensions.

89.(Previously Presented)   The system of claim 86 wherein the difference analyzer further comprises a density analyzer that is operable to determine (a) one or more dimensions of two or more groups of pixels, where each group of pixels has an image data magnitude that exceeds a predetermined allowable magnitude, and (b) whether a density of the two or more groups of pixels per unit area exceeds a predetermined allowable density.

90.(Currently Amended)   A method for selecting a reference die image comprising:
    subtracting a first die image from a second die image to create a difference image, <u>without utilizing a manually selected reference image</u>;
    determining whether the difference image contains unacceptable data; and
    storing the first die image and the second die image as reference die images without operator input if the difference image does not contain unacceptable data.

91.(Previously Presented)   The method of claim 90 wherein subtracting the first die image from the second die image comprises subtracting brightness data for each pixel of the first die image from brightness data for a corresponding pixel of the second die image.

92.(Previously Presented)   The method of claim 90, wherein subtracting the first die image from the second die image comprises subtracting image data for each pixel of the first die image from image data for a corresponding pixel of the second die image.

93.(Previously Presented)   The method of claim 90 wherein determining whether the difference image contains unacceptable data comprises:
    forming a histogram from difference image data; and
    determining whether a slope of the histogram changes from negative to positive.

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94.(Previously Presented)   The method of claim 90 wherein determining whether the difference image contains unacceptable data comprises determining whether a size of an area having a brightness deviation exceeds a predetermined allowable size.

95.(Previously Presented)   The method of claim 90 wherein determining whether the difference image contains unacceptable data comprises determining whether a size of an area having an image data deviation exceeds a predetermined allowable size.

96.(Previously Presented)   The method of claim 90 wherein determining whether the difference image contains unacceptable data comprises determining whether a number of areas having brightness deviations exceeds a predetermined allowable number of areas having brightness deviations per unit area.

97.(Previously Presented)   The method of claim 90 wherein determining whether the difference image contains unacceptable data comprises determining whether a number of areas having data deviations exceeds a predetermined allowable number of areas having image data deviations per unit area.

98.(Currently Amended)   The method of claim 90 further comprising:

   selecting two or more reference images, where each ~~difference~~reference image is selected
      from a different predetermined region of the silicon wafer; and
   combining the two or more reference images to form a reference image for use in
      comparing with each die of the silicon wafer.

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